CLAIMS

What is claimed is:

1. A method of producing an image for viewing by a user, comprising the steps of:

acquiring light from a first scene by optically scanning the first scene in a selected pattern at a first rate;

transmitting the acquired light to a second location remote from the first scene; and

at the second location, constructing the image by scanning the transmitted acquired light at a second rate substantially synchronously with the first rate.

2. The method of claim 1 wherein the step of acquiring light from a first scene by optically scanning the first scene in a selected pattern at a first rate includes scanning in a substantially raster pattern.

3. The method of claim 1 wherein the step of constructing the image by scanning the transmitted acquired light at a second rate substantially synchronously with the first rate includes scanning the transmitted acquired light onto a viewer's retina.

4. The method of claim 1 further comprising the steps of:

generating a synch signal indicative of a scanning orientation in the first location; and

transmitting the synch signal from the first location to the second location.

5. The method of claim 4 wherein the step of scanning the transmitted acquired light at a second rate substantially synchronously with the first rate includes driving a second scanner with the synch signal.

6. The method of claim 4 wherein the step of scanning the transmitted acquired light at a second rate substantially synchronously with the first rate includes

adjusting a scanning frequency of an output scanner in response to the synch signal; and

scanning the transmitted acquired light with the output scanner.

7. A method of producing an image of a remote location for viewing by a user, comprising the steps of:

receiving light from the remote location with a first scanner;

transmitting the received light to a second location separate from the remote location; and

constructing the image from the transmitted received light.

8. The method of claim 7 wherein the step of receiving light from the remote location with a first scanner includes scanning the first location in a substantially raster pattern.

9. The method of claim 7 wherein the step of constructing the image from the transmitted received light includes the step of scanning the transmitted received light onto a viewer's retina.

10. The method of claim 7 wherein the step of transmitting the received light to a second location separate from the remote location includes the steps of:

coupling the received light into an optical fiber at the remote location; and

transmitting the coupled light to the second location with the optical fiber.

11. The method of claim 10 further comprising the step of illuminating the remote location.

12. The method of claim 11 wherein the step of illuminating the remote location includes the steps of:

coupling input light into the optical fiber at a third location;

transmitting the input light to the remote location with the optical fiber; and

scanning the transmitted light into the remote location.

13. The method of claim 11 wherein the third location is different from the first and second locations.

14. An apparatus for remotely viewing an image, comprising:

a first scanner, having a first light input alignable to the image and a first light output, the first scanner being configured to capture light from the image when the first light input is aligned to the image;

a second scanner having a second light input and a second light output, the second scanner being configured to construct a virtual image at the second light output from light received at the second light input; and

an optical fiber coupled to the first scanner and extending from the first light output to the second light input.

15. The apparatus of claim 14 further comprising imaging optics coupled to the second light output, the imaging optics being configured to adjust the virtual image for viewing by a user.

16. The apparatus of claim 15 wherein the imaging optics are selected such that the adjusted virtual image is imaged directly onto the user's retina.

17. The apparatus of claim 14, wherein the second scanner is a tunable scanner having an adjustable scanning rate.

18. The apparatus of claim 14 wherein the first scanner has a first field of view and the second scanner has a second field of view different from the first field of view.

19. The apparatus of claim 18 wherein the second field of view is greater than the first field of view.

20. The apparatus of claim 14 wherein the first scanner has a variable field of view.

21. The apparatus of claim 14 wherein the second scanner has a variable field of view.

22. A remote viewing apparatus, comprising:

a first scanner having an optical input aligned with a viewing field and an output optical port, the first scanner being configured to scan the viewing field and to transmit light from the viewing field to the output optical port;

a second scanner having an optical output and an optical input port, the second scanner being operative to transmit light received at the optical input port

to the optical input and to scan the light transmitted light through a two dimensional pattern substantially synchronously with the scanning of the first scanner; and

an optical fiber coupled between the output port of the first scanner and the input port of the second scanner.

23. The apparatus of claim 22 wherein the second scanner includes a tuning assembly operative to adjust the scanning rate of the second scanner.

24. The apparatus of claim 23 further comprising a scanning monitor coupled to the first scanner, the scanning monitor having a signal output and being operative to produce an output signal at the signal output indicative of the scanning rate of the first scanner, wherein the tuning assembly includes a signal input coupled to the signal output and wherein the tuning assembly is responsive to the output signal to adjust the scanning rate of the second scanner.

25. An apparatus for transmitting images bidirectionally, comprising:

a first scanner operative to scan light at a selected scanning frequency, the first scanner being optically aligned to a first environment;

a second scanner operative to scan light at the selected frequency, the second scanner being optically aligned to a second environment physically separated from the first environment; and

an optical transmission fiber having a first end optically coupled to the first scanner and a second end optically coupled to the second scanner.

26. The apparatus of claim 25 wherein the first scanner is a resonant device having a resonant frequency equal to the selected frequency.

27. The apparatus of claim 25 wherein one of the first and second scanners has a tunable frequency.

28. The apparatus of claim 25 further comprising:

a light emitter operative to produce illuminating light; and

a second optical fiber extending between the light emitter and the second scanner, the second optical fiber having a first end optically coupled to the light emitter and a second end optically coupled to the second scanner.

29. The apparatus of claim 25 further comprising:

an output port; and

a beam splitter at the first end, the beam splitter being aligned to receive light from the optical transmission fiber, the beam splitter being configured to redirect a portion of light received from the transmission fiber to the output port.

30. The apparatus of claim 29 further comprising eye coupling optics aligned to receive the redirected light from the output port.

31. The apparatus of claim 29 further comprising coupling optics aligned to receive the redirected light from the output port and operative to produce an output beam from the redirected received light onto a photosensitive print medium.

32. The apparatus of claim 31 wherein the photosensitive print medium is a photographic film.

33. The apparatus of claim 25 further comprising a photodetector aligned to receive light from the second scanner and operative to produce an electrical signal indicative of the received light.

34. The apparatus of claim 33 further comprising a display coupled to the photodetector to receive the electrical signal indicative of the received light, the display being operative to produce a video image corresponding to the electrical signal indicative of the received redirected light.

35. The apparatus of claim 29 wherein the second scanner has a variable scan angle.

36. The apparatus of claim 29 wherein the first and second scanners are two-dimensional scanners operative to scan light in a substantially raster pattern.

37. The apparatus of claim 36 wherein the second scanner has a variable scan angle along a first axis.

38. The apparatus of claim 37 wherein the second scanner has a variable scan angle along a second scan axis orthogonal to the first axis.

39. An optical viewing apparatus, comprising:

a first scanner having a first input port and a first output port, the first scanner operative to sweep through a first angular range along a first predetermined scan pattern; and

a second scanner having a second input port and a second output port, the second scanner operative to sweep through a second angular range along a second predetermined scan pattern, the second input port being optically coupled

to the first output port, wherein one of the first and second angular ranges is variable.

40. The apparatus of claim 38 wherein the second scanner includes an electrical input, and wherein the second scanner is responsive to an electrical signal at the electrical input to vary the second angular range.

41. The apparatus of claim 38 wherein the first scanner includes an electrical input, and wherein the first scanner is responsive to an electrical signal at the electrical input to vary the first angular range.

42. The apparatus of claim 38 wherein the first scanner is a resonant scanner.

43. The apparatus of claim 40 wherein the second scanner is tunable over a selected range of frequencies to slave to the first scanner.